

THE OILING OF AMERICA

**Food corporations
and medical
authorities continue
to promote the
consumption of
hydrogenated
vegetable oils,
despite the growing
evidence as to the
health risks.**

Part 2 of 2

by Mary G. Enig, PhD
MGenig@aol.com
&
Sally Fallon
SAFallon@aol.com
© 1998

The other area needing further investigation concerned just how much *trans* fat there was in a 'normal diet' of the typical American. What had hampered any thorough research into the correlation of *trans* fatty acid consumption and disease was the fact that these altered fats were not considered as a separate category in any of the databases then available to researchers.

The massive Health and Human Services National Health and Nutrition Examination Survey (NHANES II), conducted during the years 1976 to 1980, noted the increasing US consumption of margarine, French fried potatoes, cookies and snack chips—all made with vegetable shortenings—without listing the proportion of *trans* fats present.

Mary Enig first looked at the NHANES II database in 1987 and, when she did, she had a sinking feeling. Not only were *trans* fats conspicuously absent from the fatty acid analyses, but data on other lipids made no sense at all. Even foods containing no *trans* fats were listed with faulty fatty-acid profiles. In general, the NHANES II database tended to minimise the amount of saturated fats in common foods.

Over the years, Joseph Sampagna and Mark Keeney, both highly qualified lipid biochemists at the University of Maryland, applied to the National Science Foundation, the National Institutes of Health (NIH), the US Department of Agriculture (USDA), the National Dairy Council and the National Livestock and Meat Board for funds to look into the *trans* content of common American foods. Only the National Livestock and Meat Board came through with a small grant for equipment; the others turned them down.

A USDA official confided to the Maryland research group that they "would never get money as long as they pursued the *trans* work". Nevertheless, they did pursue it. Sampagna, Keeney and a few graduate students, funded jointly by the USDA and the university, spent thousands of hours in the laboratory analysing the *trans* fat content of hundreds of commercially available foods.

In December of 1982, *Food Processing* carried a brief preview of the University of Maryland research¹⁹ and, five months later, printed a blistering letter from Edward Hunter on behalf of the Institute of Shortening and Edible Oils (ISEO).²⁰ The University of Maryland studies on *trans* fat content in common foods had obviously struck a nerve in the industry. Hunter stated that the Bailar, Applewhite and Meyer letters that had appeared in *Federation Proceedings* five years earlier, "severely criticized and discredited" the conclusions reached by Enig and her colleagues. Hunter was concerned that Enig's group would exaggerate the amount of *trans* found in common foods. He cited ISEO data indicating that most margarines and shortenings contain no more than 35 per cent and 25 per cent *trans* respectively, and that most contain considerably less.

What Enig and her colleagues actually found was that many margarines indeed contained about 31 per cent *trans* fat, while later surveys by others revealed that Parkay margarine contained up to 45 per cent *trans*, and that many shortenings found ubiquitously in cookies, chips and baked goods contained more than 35 per cent *trans* fat. Enig also discovered that many baked goods and processed foods contained considerably more fat from partially hydrogenated vegetable oils than was listed on the labels.

The final results of Enig's ground-breaking compilation were published in the October 1983 edition of the *Journal of the American Oil Chemists' Society*.²¹ Her analyses of more than 220 food items, coupled with food disappearance data, allowed University of Maryland researchers to confirm earlier estimates that the average American consumed at least 12 grams of *trans* fat per day—directly contradicting ISEO assertions that most Americans consumed no more than 6 to 8 grams of *trans* fat per day. Those who

consciously avoided animal fats typically consumed far more than 12 grams of *trans* fat per day.

THE ISEO did not want the American public to hear about the debate on hydrogenated vegetable oils. For Enig, this translated into the sound of doors closing. But, a poster presentation she organised for a campus health fair caught the eye of the dietetics department chairman who suggested she submit an abstract to the Society for Nutrition Education, many of whose members are registered dietitians. Her abstract concluded that "...meal plans and recipes developed for nutritionists and dietitians to use when designing diets to meet the Dietary Guidelines, the dietary recommendation of the American Heart Association or the Prudent Diet have been examined for *trans* fatty acid content. Some diet plans are found to contain approximately 7% or more of calories as *trans* fatty acids." The Abstract Review Committee rejected the submission, calling it of "limited interest".

Early in 1985, the Federation of American Societies for Experimental Biology (FASEB) heard more testimony on the *trans* fat issue. Enig alone represented the alarmist point of view, while Hunter and Applewhite of the ISEO and Ronald Simpson, then with the National Association of Margarine Manufacturers, assured the panel that *trans* fats in the food supply posed no danger. Enig reported on University of Maryland research that delineated the differences in small amounts of naturally occurring *trans* fats in butter, which do not inhibit enzyme function at the cellular level, and man-made *trans* fats in margarines and vegetable shortenings, which do. She also noted a 1981 feeding trial in which swine fed *trans* fatty acids developed higher parameters for heart disease than those fed saturated fats, especially when *trans* fatty acids were combined with added polyunsaturates.²² Her testimony was omitted from the final report, although her name in the bibliography created the impression that her research supported the FASEB whitewash.²³

In the following year, 1986, Hunter and Applewhite published an article, exonerating *trans* fats as a cause of atherosclerosis, in the prestigious *American Journal of Clinical Nutrition*²⁴—which, by the way, is sponsored by companies including Procter & Gamble, General Foods, General Mills, Nabisco and Quaker Oats. The authors once again stressed that the average per-capita consumption of *trans* fatty acids did not exceed 6 to 8 grams.

Behind the scenes, in a private letter to Dr Kenneth Fischer, Director of the Life Sciences Research Office (LSRO), Hunter and Applewhite charged that: "...the University of Maryland group continues to raise unwarranted and unsubstantiated concerns about the intake of and imagined physiological effects of *trans* fatty acids and...they continue to overestimate greatly the intake of *trans* acids by typical Americans." They said: "No one other than Enig has raised questions about the validity of the food fatty-acid composition data used in NHANES II and...she has not presented sufficiently compelling arguments to justify a major re-evaluating."

The letter contained numerous other innuendos that Enig had mischaracterised the work of other researchers and had been less than scientific in her research. It was widely circulated among

NNMS agencies. John Weihrach—a USDA scientist, not an industry representative—surreptitiously slipped the letter to Dr Enig. She and her colleagues replied by asking: "If the trade association truly believes 'that *trans* fatty acids do not pose any harm to humans and animals'...why are they so concerned about any levels of consumption and why do they so vehemently and so frequently attack researchers whose findings suggest that the consumption of *trans* fatty acids is greater than the values the industry reports?"

The Maryland researchers argued that *trans* fats should be included in food nutrition labels; but the Hunter and Applewhite letter asserted that "there is no documented justification for including *trans* acids...as part of nutrition labeling".

During her testimony, Enig also brought up her concerns about other national food databases, citing their lack of information on *trans*. The Food Consumption Survey contained glaring errors—reporting, for example, consumption of butter in amounts nearly twice as great as what exists in the US food supply, and of margarine in quantities nearly half those known to exist in the food supply. The NNMS officials responded to Enig's criticism by

dropping the whole section pertaining to butter and margarine from the 1980 tables.

The ISEO did not want the American public to hear about the debate on hydrogenated vegetable oils.

The Enig-ISEO debate was covered by the prestigious *Food Chemical News* and *Nutrition Week*²⁵—both widely read by Congress and the food industry, but virtually unknown to the general public. National media coverage of dietary fat issues focused on the proceedings of the National Heart, Lung and Blood Institute (NHLBI), as this enormous bureaucracy ploughed relentlessly forward with the lipid hypothesis. In June of 1984, for

example, the press diligently reported the proceedings of the NHLBI's Lipid Research Clinics (LRC) Conference which was organised to wrap up almost 40 years of research on lipids, cholesterol and heart disease. The problem with the 40 years of NHLBI-sponsored research on lipids, cholesterol and heart disease was that it had not produced many answers—at least not many answers that pleased the NHLBI.

The ongoing Framingham Study found that there was virtually no difference in coronary heart disease (CHD) "events" for individuals with cholesterol levels between 205 mg/dL and 294 mg/dL—the vast majority of the US population. Even for those with extremely high cholesterol levels—up to almost 1,200 mg/dL—the difference in CHD events compared to those in the normal range was trivial.²⁶

The NHLBI's Multiple Risk Factor Intervention Trial (MRFIT) studied the relationship between heart disease and serum cholesterol levels in 362,000 men, and found that annual deaths from CHD varied from slightly less than one per thousand, for serum cholesterol levels below 140 mg/dL, to about two per thousand, for serum cholesterol levels above 300 mg/dL—once again, a trivial difference. Dr John LaRosa, of the American Heart Association (AHA), claimed that the curve for CHD deaths began to "inflect" after 200 mg/dL, when in fact the "curve" was a very gradually sloping straight line that could not be used to predict whether serum cholesterol above certain levels posed a significantly greater risk for heart disease. One unexpected MRFIT

finding the media did not report was that deaths from all causes—cancer, heart disease, accidents, infectious disease, kidney failure, etc.—were substantially greater for those men with cholesterol levels below 160 mg/dL.²⁷

What was needed to resolve the validity of the lipid hypothesis once and for all was a well-designed, long-term diet study that compared coronary heart disease events in those eating traditional foods with those whose diets contained high levels of vegetable oils—but the proposed Diet-Heart Study designed to test just that had been cancelled without fanfare years earlier.

In view of the fact that orthodox medical agencies were united in their promotion of margarine and vegetable oils over animal foods containing cholesterol and animal fats, it is surprising that the official literature can cite only a handful of experiments indicating that dietary cholesterol has "a major role in determining blood cholesterol levels".

One of these was a study, involving 70 male prisoners, directed by Fred Mattson²⁸—the same Fred Mattson who had pressured the AHA into removing any reference to hydrogenated fats from its diet/heart statement a decade earlier. Funded in part by Procter & Gamble, the research contained a number of serious flaws. The biggest flaw was that the subjects receiving cholesterol did so in the form of reconstituted powder—a totally artificial diet. Mattson's discussion did not even address the possibility that the liquid formula diet he used might affect blood cholesterol differently than would a whole-foods diet, when many other studies indicated that this is in fact the case.

The culprit in liquid protein diets actually seems to be oxidised cholesterol, formed during the high-temperature drying process, which seems to initiate the build-up of plaque in the arteries.²⁹ To give it 'body', powdered milk containing oxidised cholesterol is added to reduced fat milk—which the American public has accepted as a healthier choice than whole milk. It was purified, oxidised cholesterol that Kritchevsky and others used in their experiments on vegetarian rabbits.

The NHLBI argued that a diet study using whole foods and involving the whole population would be too difficult to design and too expensive to carry out. But the NHLBI *did* have funds available to sponsor the massive Lipid Research Clinics Coronary Primary Prevention Trial in which all subjects were placed on a diet low in cholesterol and saturated fat. Subjects were divided into two groups, one of which took a cholesterol-lowering drug and the other a placebo. Working behind the scenes, but playing a key role in both the design and implementation of the trials, was Dr Fred Mattson, formerly of Procter & Gamble.

An interesting feature of the study was the fact that a good part of the trial's US\$150 million budget was devoted to group sessions in which trained dietitians taught both groups of study participants how to choose "heart-friendly" foods: margarine, egg replacements, processed cheese, baked goods made with vegetable shortenings; in short, the vast array of manufactured foods awaiting consumer acceptance. As both groups received dietary indoctrination, study results could support no claims about the relation of diet to heart disease. Nevertheless, when the results were released, both the popular press and medical journals portrayed the Lipid Research Clinics trials as the long-sought proof

that animal fats were the cause of heart disease. Rarely mentioned in the press was the ominous fact that the group taking the cholesterol-lowering drugs had an increase in deaths from cancer, stroke, violence and suicide.³⁰

A number of clinicians and statisticians, including Michael Oliver and Richard Krommel, who participated in a 1984 Lipid Research Clinics conference workshop, were highly critical of the manner in which the LRC results had been tabulated and manipulated. In fact, the conference went very badly for the NHLBI, with critics of the lipid hypothesis almost outnumbering supporters.

Dissenters were again invited to speak briefly at the NHLBI-sponsored National Cholesterol Consensus Conference held later that year, but their views were not included in the panel's report for the simple reason that the report was generated by NHLBI staff before the conference convened. Dr Bev Teter, of the

University of Maryland's lipid group, discovered this when she picked up some papers by mistake just before the conference began, and found they contained the consensus report, already written, with just a few numbers left blank.

The 1984 Cholesterol Consensus Conference final report was a white-wash, containing no mention of the large body of evidence that conflicted with the lipid hypothesis. One of the blanks was filled in with the number '200'. The document defined all those with cholesterol levels above 200 mg/dL as "at risk" and called for mass

cholesterol screening, even though the most ardent supporters of the lipid hypothesis had surmised in print that 240 should be the magic cut-off point. Such screening would in fact need to be carried out on a massive scale, as the federal medical bureaucracy, by picking the number 200, had *defined* the vast majority of the American adult population as "at risk". The report resurrected the ghost of Norman Jolliffe and his Prudent Diet by suggesting the avoidance of saturated fat and cholesterol for all Americans now defined as "at risk", and specifically advised the replacement of butter with margarine.

The Consensus Conference also provided a launching pad for the nationwide National Cholesterol Education Program (NCEP) which had the stated goal of "changing physicians' attitudes". NHLBI-funded studies had determined that while the general population had bought into the lipid hypothesis and was dutifully using margarine and buying low-cholesterol foods, the medical profession remained sceptical. A large "Physicians Kit" was sent to all doctors in America, compiled in part by the American Pharmaceutical Association whose representatives served on the NCEP coordinating committee. Doctors were taught the importance of cholesterol screening, the advantages of cholesterol-lowering drugs and the unique benefits of the Prudent Diet. NCEP materials told every doctor in America to recommend the use of margarine rather than butter.

Other mouthpieces of the medical establishment fell in line after the Consensus Conference. In 1987, the National Academy of Sciences published an overview in the form of a handout booklet, containing a whitewash of the *trans* problem and a pejorative description of palm oil—a natural fat high in beneficial saturates and mono-unsaturates that, like butter, has

... it is surprising that the official literature can cite only a handful of experiments indicating that dietary cholesterol has "a major role in determining blood cholesterol levels".

nourished healthy population groups for thousands of years, and, also like butter, competes with hydrogenated fats because it can be used as a shortening.

The following year, the Surgeon General's Report on Nutrition and Health emphasised the importance of making low-fat foods more widely available. Project LEAN (Low-fat Eating for America Now)—sponsored by the J. Kaiser Family Foundation and a host of establishment groups such as the American Heart Association, the American Dietetic Association, the American Medical Association, the USDA, the National Cancer Institute, the Centers for Disease Control and the National Heart, Lung and Blood Institute—announced a publicity campaign to "aggressively promote foods low in saturated fat and cholesterol in order to reduce the risk of heart disease and cancer".

The next year, Enig joined Frank McLaughlin, Director of the Center for Business and Public Policy at the University of Maryland, in testimony before the National Food Processors Association (NFPA). It was a closed conference for NFPA members only. Enig and McLaughlin had been invited to give "a view from academia". Enig presented a number of slides and warned against singling out classes of fats and oils for special pejorative labelling. A representative from Frito-Lay took umbrage at Enig's slides which listed amounts of *trans* fats in Frito-Lay products. Enig offered to re-do the analyses if Frito-Lay were willing to fund the research. "If you'd talk different, you'd get money," he said.

Enig urged the association to endorse accurate labelling of *trans* fats in all food items, but conference participants—including representatives from most of the major food processing giants—preferred a policy of "voluntary labelling" that did not unnecessarily alert the public to the presence of *trans* fats in their foods. To date, they have prevailed in preventing the inclusion of *trans* fats on nutrition labels.

Enig and the University of Maryland group were not alone in their efforts to bring their concerns about the effect of partially hydrogenated fats before the public.

Kummerow at the University of Illinois, blessed with independent funding and an abundance of patience, carried out a number of studies that indicated that *trans* fats increased the risk factors associated with heart disease and that vegetable-oil-based fabricated foods such as Egg Beaters cannot support life.³¹

George Mann, formerly with the Framingham project, possessed neither funding nor patience and in fact was very angry with what he called the "Diet/Heart scam". His independent studies of the Masai in Africa,³² whose diet is extremely rich in cholesterol and saturated fat and who are virtually free of heart disease, had convinced him that the lipid hypothesis was "the public health diversion of this century...the greatest scam in the history of medicine".³³

Mann resolved to bring the issue before the public by organising a conference in Washington, DC, in November of 1991. "Hundreds of millions of tax dollars are wasted by the bureaucracy and the self-interested Heart Association," he wrote in his invitation to participants. "Segments of the food industry play the game for profits. Research on the true causes and prevention is

stifled by denying funding to the 'unbelievers'. This meeting will review the data and expose the rascals."

The rascals did their best to prevent the meeting from taking place. Funding promised by the Greenwall Foundation of New York City was later withdrawn, so Mann paid most of the bills. A press release, sent as a dirty trick to speakers and participants, wrongly announced that the conference had been cancelled. Several speakers, including the prestigious Dr Roslyn Alfin-Slater and Dr Peter Nixon of London, did in fact renege at the last minute on their commitment to attend. Dr Eliot Corday of Los Angeles cancelled after being told that his attendance would jeopardise future funding.

The final pared-down roster included: Dr George Mann; Dr Mary Enig; Dr Victor Herbert; Dr Petr Skrabenek; Dr James McCormick, a physician from Dublin; Dr William Stehbens from New Zealand, who described the normal protective process of arterial thickening at points of greatest stress and pressure; and Dr Meyer Texon, an expert in the dynamics of blood flow.

Mann, in his presentation, blasted the system that had foisted the diet/heart-disease dogma on a gullible public. "You will see," he said, "that many of our contributors are senior scientists. They are so for a reason that has become painfully conspicuous as we organised this meeting. Scientists who must go before review panels for their research funding know well that to speak out, to disagree with this false dogma of Diet/Heart, is a fatal error. They

must comply or go unfunded. I could show a list of scientists who said to me, in effect, when I invited them to participate, 'I believe you are right, that the Diet/Heart hypothesis is wrong, but I cannot join you because that would jeopardise my perks and funding.' For me, that kind of hypocritical response separates the scientists from the operators, the men from the boys."

"I believe you are right, that the Diet/Heart hypothesis is wrong, but I cannot join you because that would jeopardise my perks and funding."

By the 1990s the operators had succeeded, by slick manipulation of the press and of scientific research, in transforming America into a nation that was well and truly oiled. Consumption of butter had bottomed out at about 5 grams per person per day, down from almost 18 grams at the turn of the century. Use of lard and tallow had been reduced by two-thirds. Margarine consumption had jumped from less than 2 grams per person per day in 1909 to about 11 grams in 1960. Since then, consumption figures have changed little, remaining at about 11 grams per person per day—perhaps because knowledge of margarine's dangers has been slowly seeping out to the public.

However, most of the *trans* fats in the current American diet come not from margarine but from shortening used in fried and fabricated foods. American shortening consumption of 10 grams per person per day held steady until the 1960s, although the content of that shortening had changed from mostly lard, tallow and coconut oil—all natural fats—to partially hydrogenated soybean oil. Then shortening consumption shot up and by 1993 had tripled to over 30 grams per person per day. But the most dramatic overall change in the American diet was the huge increase in the consumption of liquid vegetable oils, from slightly less than 2 grams per person per day in 1909 to over 30 grams in 1993—a fifteenfold increase.

The irony is that these trends have persisted concurrently with revelations about the dangers of polyunsaturates. Because

polyunsaturates are highly subject to rancidity, they increase the body's need for vitamin E and other antioxidants.

Excess consumption of vegetable oils is especially damaging to the reproductive organs and the lungs—both of which are sites for huge increases in cancer in Americans. In test animals, diets high in polyunsaturates from vegetable oils inhibit the ability to learn, especially under conditions of stress; they are toxic to the liver; they compromise the integrity of the immune system; they depress the mental and physical growth of infants; they increase levels of uric acid in the blood; they cause abnormal fatty acid profiles in the adipose tissues; they have been linked to mental decline and chromosomal damage; and they accelerate ageing.

Excess consumption of polyunsaturates is associated with increasing rates of cancer, heart disease and weight gain. The excessive use of commercial vegetable oils interferes with the production of prostaglandins, leading to an array of complaints ranging from autoimmune disease to premenstrual syndrome (PMS). Disruption of prostaglandin production leads to an increased tendency to form blood clots, and hence to myocardial infarction—which has reached epidemic levels in the US.³⁴

Those who have most actively promoted the use of polyunsaturated vegetable oils as part of a Prudent Diet are well aware of their dangers. In 1971, William B. Kannel, former Director of the Framingham Study, warned against including too many polyunsaturates in the diet. A year earlier, Dr William Connor of the American Heart Association issued a similar warning, and Frederick Stare reviewed an article which reported that the use of polyunsaturated oils caused an increase in breast tumours. And Kritchevsky, way back in 1969, discovered that the use of corn oil caused an increase in atherosclerosis.³⁵

As for the *trans* fats produced in vegetable oils when they are partially hydrogenated, the results that are now in the literature more than justify the concerns of early investigators about the relation between *trans* fats and both heart disease and cancer.

The research group at the University of Maryland found that *trans* fatty acids not only alter enzymes that neutralise carcinogens and increase enzymes that potentiate carcinogens, but in nursing mothers they also depress milk-fat production and decrease insulin binding.³⁶ In other words, *trans* fatty acids in the diets of new mothers interfere with their ability to nurse successfully and increase their likelihood of developing diabetes.

Unpublished work indicates that *trans* fats contribute to osteoporosis. Hanis, a Czechoslovakian researcher, found that *trans* consumption decreased testosterone, caused the production of abnormal sperm and altered gestation.³⁷ Koletzko, a German paediatrics researcher, found that excess *trans* consumption in pregnant women predisposed them to having low-birth-weight babies.³⁸ *Trans* consumption interferes with the body's use of omega-3 fatty acids (found in fish oils, grains and green vegetables), leading to impaired prostaglandin production.³⁹ George Mann confirmed that *trans* consumption increases the incidence of heart disease.⁴⁰ In 1995, European researchers found a positive correlation between breast cancer rates and *trans* consumption.⁴¹

Until the 1993 studies, only the disturbing revelations of Dutch researchers Mensink and Katan in 1990 received front-page coverage. Mensink and Katan found that margarine consumption

increased coronary heart disease risk factors.⁴² The industry—and the press—responded by promoting tub spreads which contain reduced amounts of *trans* compared to stick margarine.

For the general population, these *trans* reductions have been more than offset by changes in the types of fat used by the fast-food industry. In the early 1980s, the Center for Science in the Public Interest campaigned against the use of beef tallow for frying potatoes. Before that, it campaigned against the use of tallow for frying chicken and fish. Most fast-food concerns switched to partially hydrogenated soybean oil for all fried foods. Some deep-fried foods have been tested at almost 50 per cent *trans*.⁴³

The industry continues to argue that American *trans* consumption is a low 6 to 8 grams per person per day—not enough to contribute to today's epidemic of chronic disease. Total per-capita consumption of margarine and shortening hovers around 40 grams per person per day. If these products contain 30 per cent *trans* (many shortenings contain more), then average consumption is about 12 grams per person per day.

In reality, consumption figures can be dramatically higher for some individuals. A 1989 *Washington Post* article documented the diet of a teenage girl who ate 12 doughnuts and 24 cookies over a three-day period; her total *trans* intake worked out to at least 30 grams per day, and possibly much more. The fat in the chips that teenagers consume in abundance may contain up to 48

per cent *trans*, which translates into 45.6 grams of *trans* fat in a small, 10-ounce (284-gram) bag of snack chips which a hungry teenager can gobble up in a few minutes. High school sex education classes do not teach American teenagers that the altered fats in their snack foods may severely compromise their ability to have normal sex, to conceive, to give birth to healthy babies and successfully nurse their infants.

Foods containing *trans* fat sell because the American public is afraid of the alternative: saturated fats

found in tallow, lard, butter, palm oil and coconut oil—fats traditionally used for frying and baking. Yet the scientific literature delineates a number of vital roles for dietary saturated fats: they enhance the immune system,⁴⁴ are necessary for healthy bones,⁴⁵ provide energy and structural integrity to the cells,⁴⁶ protect the liver,⁴⁷ and enhance the body's use of essential fatty acids.⁴⁸ Stearic acid, found in beef tallow and butter, has cholesterol-lowering properties and is a preferred food for the heart.⁴⁹ As saturated fats are stable, they do not become rancid easily, they do not call upon the body's reserves of antioxidants, they do not initiate cancer, and they do not irritate the artery walls.

Your body makes saturated fats, and your body makes cholesterol—about 2,000 mg per day. In general, cholesterol that the average American absorbs from food amounts to about 100 mg per day. So, in theory, even reducing animal foods to zero will result in only a five per cent decrease in the total amount of cholesterol available to the blood and tissues. In practice, such a diet is likely to deprive the body of the substrates it needs to manufacture enough of this vital substance.

Cholesterol, like saturated fats, stands unfairly accused. It acts as a precursor to vital corticosteroids (hormones that help us deal with stress and protect the body against heart disease and cancer) and to the sex hormones like androgen, testosterone, oestrogen and progesterone. It is a precursor to vitamin D, a very important

Cholesterol, like saturated fats, stands unfairly accused. It has a number of important functions in the body.

fat-soluble vitamin needed for healthy bones and nervous system, proper growth, mineral metabolism, muscle tone, insulin production, reproduction and immune system function. And it is the precursor to bile salts which are vital for digestion and assimilation of fats in the diet.

Recent research shows that cholesterol acts as an antioxidant.⁵⁰ This is the likely explanation for the fact that cholesterol levels go up with age. As an antioxidant, cholesterol protects us against free-radical damage that leads to heart disease and cancer. Cholesterol is the body's repair substance, manufactured in large amounts when the arteries are irritated or weak. Blaming heart disease on high serum cholesterol levels is like blaming firemen, who have come to put out a fire, for starting the blaze.

Cholesterol is needed for proper function of serotonin receptors in the brain.⁵¹ Serotonin is the body's natural 'feel-good' chemical. This explains why low cholesterol levels have been linked to aggressive and violent behaviour, depression and suicidal tendencies. Mother's milk is particularly rich in cholesterol and contains a special enzyme that helps the baby utilise this nutrient. Babies and children need cholesterol-rich foods throughout their growing years to ensure proper development of the brain and nervous system. Dietary cholesterol plays an important role in maintaining the health of the intestinal wall,⁵² which is why low-cholesterol vegetarian diets can lead to leaky gut syndrome and other intestinal disorders.

Animal foods containing saturated fat and cholesterol provide vital nutrients necessary for growth, energy and protection from degenerative disease. Like sex, animal fats are necessary for reproduction. Humans are drawn to both by powerful instincts. Suppression of natural appetites leads to weird nocturnal habits, fantasies, fetishes, bingeing and splurging. Animal fats are nutritious and satisfying and they taste good.

"Whatever is the cause of heart disease," said the eminent biochemist Michael Gurr in a recent article, "it is not primarily the consumption of saturated fats."⁵³ And yet the high priests of the lipid hypothesis continue to lay their curse on the fairest of culinary pleasures: butter and Béarnaise, whipped cream, soufflés and omelettes, full-bodied cheeses, juicy steaks and pork sausages.

On April 30, 1996, senior researcher David Kritchevsky received the American Oil Chemists' Society's Research Award in recognition of his accomplishments as a "researcher on cancer and atherosclerosis as well as cholesterol metabolism". His accomplishments include co-authorship of more than 370 research papers, one of which appeared a month later in the *American Journal of Clinical Nutrition*.⁵⁴ "Position Paper on *Trans Fatty Acids*" continued the debate on *trans* fats that began in the same journal with Hunter and Applewhite's 1986 attack on Enig's research. "A controversy has arisen about the potential health hazards of *trans* unsaturated fatty acids in the American diet," wrote Kritchevsky and his co-authors.

Actually, the controversy dates back to 1954. In the rabbit studies that launched Kritchevsky on his career, the researcher actually found that cholesterol fed with Wesson oil "markedly accelerated" the development of cholesterol-containing low-density lipoproteins; and cholesterol fed with shortening gave chole-

sterol levels twice as high as cholesterol fed alone.⁵⁵ Enig's work—and that of Kummerow and Mann and several others—merely confirmed what Kritchevsky ascertained decades ago but declined to publicise: that vegetable oils, and particularly partially hydrogenated vegetable oils, are bad news.

However, "Position Paper on *Trans Fatty Acids*" took no position at all. Studies have given contradictory results, said the authors, and the amount of *trans* in the average American diet is very difficult to determine. As for labelling, the authors said: "There is no clear choice of how to include *trans* fatty acids on the nutrition label. The database is insufficient to establish a classification scheme for these fats." There may be problems with *trans*, says the senior researcher, but their use "...helps to reduce the intake of dietary fats higher in saturated fatty acids. Also, vegetable fats are not a source of dietary cholesterol, unlike saturated animal fats."

Kritchevsky and his co-authors concluded that physicians and nutritionists should "...focus on a further decrease in total fat intake and especially the intake of saturated fat... A reduction in total fat intake simplifies the problem, because all fats in the diet decrease and choices are unnecessary." However, even senior scientists find that fence-straddling is necessary. "We may conclude," wrote Kritchevsky and his colleagues, "that consumption of liquid vegetable oils is preferable to solid fats."

As a footnote, early in 1998 a symposium entitled "Evolution of Ideas about the Nutritional Value of Dietary Fat" reviewed the many flaws in the lipid hypothesis and highlighted a study in which mice fed on purified diets died within 20 days, but mice fed on whole milk stayed alive for several months.⁵⁶ One of the symposium participants was David Kritchevsky. He noted that the use of low-fat diets and drugs in intervention trials "did not affect overall CHD mortality". Ever with a finger in the wind, this influential founding father of the lipid hypothesis concluded

thus: "Research continues apace and, as new findings appear, it may be necessary to re-evaluate our conclusions and preventive medicine policies."

Editor's Note:

This is an edited version of Part 2, with renumbered endnotes. The complete transcript and endnotes can be downloaded from our web page <www.peg.apc.org/~nexus/>.

About the Authors:

- Mary G. Enig, PhD, is an expert of international renown in the field of lipid biochemistry. She has headed a number of studies on the content and effects of *trans* fatty acids, and has successfully challenged government assertions that dietary animal fat causes cancer and heart disease. She is a licensed nutritionist, a qualified expert witness, a nutrition consultant to individuals, industry, and state and federal governments, a contributing editor to a number of scientific publications, a Fellow of the American College of Nutrition, and President of the Maryland Nutritionists Association.

- Sally Fallon is the author of *Nourishing Traditions: The Cookbook that Challenges Politically Correct Nutrition and the Diet Dictocrats* (with Pat Connolly, Executive Director of the Price-Pottenger Nutrition Foundation, and Mary G. Enig, PhD), as well as of numerous articles on the subject of diet and health.

... low cholesterol levels have been linked to aggressive and violent behaviour, depression and suicidal tendencies.

Continued on page 82

Endnotes

19. "New Focus on *Trans* Fatty Acids," *Food Processing*, December 1982, pp. 64-66
20. Hunter, E. J., "More on Those *Trans* Fatty Acids", *Food Processing*, May 1983, pp. 35-36
21. Enig, M. G. et al., "Fatty Acid Composition of the Fat in Selected Food Items with Emphasis on *Trans* Components", *J. Am. Oil Chem. Soc.* 60(10):1788-1795, 1983
22. Elson, C. E. et al., "The Influence of Dietary Unsaturated *Cis* and *Trans* and Saturated Fatty Acids on Tissue Lipids of Swine", *Atherosclerosis* 40:115-137, 1981
23. Senti, F. R. (ed.), *Health Aspects of Dietary *Trans* Fatty Acids*, Life Sciences Research Office (LSRO)/Fed. Am. Soc. Exp. Biol. (FASEB), Bethesda, MD, USA, 1985
24. Hunter, J. E. and T. Applewhite, "Isomeric Fatty Acids in the US Diet: Levels and Health Perspectives", *Am. J. Clin. Nutr.* 44:707-717, 1986
25. *Food Chemical News* 29(47):52, January 25, 1988; *Nutrition Week*, Community Nutrition Institute (CNI), June 16, 1988, p. 6
26. Smith, R. and E. R. Pinckney, *Diet, Blood Cholesterol and Coronary Heart Disease: A Critical Review of the Literature*, Vector Enterprises, Sherman Oaks, CA, USA, 1991, vol. 2
27. "Multiple Risk Factor Intervention Trial: Risk Factor Changes and Mortality Results", *JAMA* 248(12):1465, September 24, 1982
28. Mattson, F. H. et al., "Effect of Dietary Cholesterol on Serum Cholesterol in Men", *Am. J. Clin. Nutr.* 25:589, 1972
29. Addis, P., *Food and Nutrition News* 62(2):7-10, March/April 1990
30. "The Lipid Research Clinics Coronary Primary Prevention Trial Results: I. Reduction in Incidence of Coronary Heart Disease", *JAMA* 251:359, 1984
31. Kummerow, F. A., "Nutritional Effects of Isomeric Fats: Their Possible Influence on Cell Metabolism or Cell Structure", *Dietary Fats and Health* (E. G. Perkins and W. J. Visek, eds), The American Oil Chemists' Society, Champaign, IL, USA, 1983, pp. 391-402;
- Kummerow, F. A., "Nutritional Aspects of Isomeric Fats", *Lipids in Modern Nutrition* (M. Horisberger and U. Bracco, eds), Nestlé Nutrition, Vevey/Raven Press, New York, 1987
32. Mann, G. V. et al., "Atherosclerosis in the Maasai", *Am. J. Epidemiol.* 95:6-37, 1972
33. Mann, George V. (ed.), *Coronary Heart Disease: The Dietary Sense and Nonsense*, Veritas Society, London, UK, 1993, p. 1
34. A general review of citations for problems with polyunsaturate consumption is found in E. R. Pinckney and C. Pinckney, *The Cholesterol Controversy*, Sherbourne Press, Los Angeles, CA, USA, 1973, pp. 127-131
35. Kritchevsky, D., *Medical Counterpoint*, March 1969
36. Teter, B. B. et al., "Milk Fat Depression in C57B1/6J Mice Consuming Partially Hydrogenated Fat", *Journal of Nutrition* 120:818-824, 1990;
- Barnard et al., "Dietary *Trans* Fatty Acids Modulate Erythrocyte Membrane Fatty Acid Composition and Insulin Binding in Monkeys", *J. of Nutritional Biochemistry* 1:190-195, 1990
37. Hanis, T. et al., "Effects of Dietary *Trans* Fatty Acids on Reproductive Performance of Wistar Rats", *British Journal of Nutrition* 61:519-529, 1989
38. Koletzko, B. and J. Muller, "*Cis*- and *Trans*- Isomeric Fatty Acids in Plasma Lipids of Newborn Infants and Their Mothers", *Biology of the Neonate* 57:172-178, 1990
39. Horrobin, D., "The Regulation of Prostaglandin Biosynthesis by Manipulation of Essential Fatty Acid Metabolism", *Reviews in Pure and Applied Pharmacological Sciences* 4:339-383, 1983
40. Mann, G. V., "Metabolic Consequences of Dietary *Trans* Fatty Acids", *Lancet* 343:1268-1271, 1994
41. Kohlmeier, L. et al., "Stores of *Trans* Fatty Acids and Breast Cancer Risk", *Am. J. Clin. Nutr.* 61:896, A25, 1995
42. Mensink, R. P. and M. Katan, "Effect of Dietary *Trans* Fatty Acids on High-Density and Low-Density Lipoprotein Cholesterol Levels in Healthy Subjects", *N. Eng. J. Med.* 323:439-445, 1990
43. Enig, M. G. et al., "Isomeric *Trans* Fatty Acids in the US Diet", *J. Am. Coll. Nutr.* 9:471-486, 1990
44. Kabara, J. J., *The Pharmacological Effects of Lipids* (J. J. Kabara, ed.), The American Oil Chemists' Society (AOCS), Champaign, IL, USA, 1978, pp. 1-14;
- Cohen, L. A. et al., *J. Natl. Cancer Inst.* 77:43, 1986
45. Watkins, B. A. et al., "Importance of Vitamin E in Bone Formation and in Chondrocyte Function", *AOCS Proceedings*, Purdue University, Lafayette, IN, USA, 1996;
- Watkins, B. A. and M. F. Seifert, "Food Lipids and Bone Health", *Food Lipids and Health* (R. E. McDonald and D. B. Min, eds), Marcel Dekker, Inc., New York, NY, p. 101
46. Mead, J. F. et al., *Lipids: Chemistry, Biochemistry and Nutrition*, Plenum Press, New York, 1986
47. Nanji, A. A. et al., *Gastroenterology* 109(2):547-54, August 1995;
- Cha, Y. S. and D. S. Sachan, *J. Am. Coll. Nutr.* 13(4):338-43, August 1994
48. Garg, M. L. et al., *The FASEB Journal* 2(4), A852, 1988;
- Oliart Ros, R. M. et al., "Meeting Abstracts", *AOCS Proceedings*, Chicago, IL, USA, May 1998, p. 7
49. Lawson, L. D. and F. Kummerow, "B-Oxidation of the Coenzyme A Esters of Vaccenic, Elaidic and Petroselaidic Acids by Rat Heart Mitochondria", *Lipids* 14:501-503, 1979
50. Cranton, E. M. and J. P. Frackelton, "Free Radical Pathology in Age-Associated Diseases: Treatment with EDTA Chelation, Nutrition and Antioxidants", *Journal of Holistic Medicine*, Spring/Summer 1984, pp. 6-37
51. Engelberg, H., "Low Serum Cholesterol and Suicide", *Lancet* 339:727-728, March 21, 1992
52. Alfin-Slater, R. B. and L. Aftergood, "Lipids", *Modern Nutrition in Health and Disease* (R. S. Goodhart and M. E. Shils, eds), Lea & Febiger, Philadelphia, USA, 1980, 6th ed., p. 134
53. Gurr, M., "A Fresh Look at Dietary Recommendations", *Inform* 7(4):432-435, April 1996
54. AIN/ASCN Task Force on *Trans* Fatty Acids, "Position Paper on *Trans* Fatty Acids", *Am. J. Clin. Nutr.* 63:663-670, 1996
55. Lemmon, R. M., D. Kritchevsky et al., "The Effect of Delta-7-Cholesterol Feeding on the Cholesterol and Lipoproteins of Rabbit Serum", *Archives of Biochemistry & Biophysics* (NY) 51(1):1161-9, July 1954;
- Kritchevsky, D. et al., "Effect of Cholesterol Vehicle in Experimental Atherosclerosis", *Am. J. Physiol.* 178:30-32, July-September 1954
56. Olson, R. E., "Evolution of Ideas about the Nutritional Value of Dietary Fat: Introduction", *J. Nutr.* 128:421S-425S, 1998